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NOTE BY PROF. JOHNSON.—The following formula in Spherical Trigonometry is not to be found in any treatise I have seen.

$$\frac{\sin^2 A}{\sin^2 a} = \frac{\sin^2 B}{\sin^2 b} = \frac{\sin^2 C}{\sin^2 c} = \frac{1 + \cos A \cos B \cos C}{1 - \cos a \cos b \cos c}.$$

The proof is very simple; from the usual formulæ we have

$$\cos^2 a = \cos a \cos b \cos c + \sin b \sin c \cos A \cos a;$$

adding $\sin^2 a$ and transposing,

$$1 - \cos a \cos b \cos c = \sin^2 a + \sin b \sin c \cos A \cos a; \quad (1)$$

also $\cos^2 A = -\cos A \cos B \cos C + \sin B \sin C \cos a \cos A,$

whence $1 + \cos A \cos B \cos C = \sin^2 A + \sin B \sin C \cos a \cos A. \quad (2)$

Dividing (2) by (1), we have the formula.

PROBLEMS.

401. *By M. Updegraff, Madison, Wis.*—If two triangles are so situated that the three lines drawn thro' their corresponding vertices meet in a point, then will the corresponding sides produced meet in three points which lie on the same straight line.

402. *By Prof. W. P. Casey.*—Upon two sides of a triangle, describe equilateral triangles, and upon the same two sides, but in the opposite direction, describe two others, and let O, O_1 be the centres of the inscribed circles in the first pair and P, P_1 those of the second pair. It is required to prove, geometrically, that the sum of the squares of the sides of the triangle $= 3(OO_1)^2 + 3(PP_1)^2$.

403. *By Prof. W. W. Johnson.*—If, from the centre C of an equilateral hyperbola, CA be drawn bisecting the angle between the axis and an asymptote, and the chord AB be drawn perpendicular to CA ; then $AB = 2CA$.

404. *By Prof. M. L. Comstock.*—A heavy triangle ABC is suspended from a point by three strings, mutually at right angles, attached to the angular points of the triangle; if θ be the inclination of the triangle to the horizon in its position of equilibrium, then

$$\cos \theta = \frac{3}{\sqrt{(1 + \sec A \sec B \sec C)}}.$$

(Todhunter's Analytical Statics, page 81.)

405. *By Prof. C. A. Van Velzer.*—Prove that a determinant which vanishes may be transformed into one having, at the same time, two identical rows and two identical columns.

406. By William Hoover, A. M. Dayton, Ohio.—Find x from the eq'n
 $\cot 2^{x-1} a - \cot 2^x a = \operatorname{cosec} 3a.$

407. By Henry Heaton, Lewis, Iowa.—Evaluate

$$\int_0^{\frac{\pi}{2}} (1 + \cos^4 \theta)^{\frac{1}{2}} d\theta.$$

408. By W. E. Heal.—Two points, one on each of two confocal ellipsoids, are said to correspond if

$$\frac{x}{a} = \frac{X}{A}, \quad \frac{y}{b} = \frac{Y}{B}, \quad \frac{z}{c} = \frac{Z}{C}.$$

Prove that the distance between two points, one on each of two confocal ellipsoids is equal to the distance bet. the corresp. points. (Ivory's Th.)

PUBLICATIONS RECEIVED.

Logarithms. By H. N. WHEELER. Used at Harvard College in connect'n with Wheeler's. Trigonometry and Peirce's Logarithm Tables. 43 pages. Cambridge: 1882.

The Multisector and Polyode. (Pamphlet.) By J. W. NICHOLSON, A. M., Baton Rouge, La.
 The Multisector is an instrument devised for drawing a curve, the "Polyode", by which an angle is not only trisected but may be divided into any number of equal parts.

New, simple and Complete Demonstration of the Binomial Theorem and Logarithmic Series.
 By J. W. NICHOLSON, M. A.

Newcomb's Mathematical Course :

Elements of Geometry ; 399 pages. New York : Henry Holt & Co. 1881 :

A School Algebra ; 279 pages :

Algebra for Schools and Colleges ; 474 pages. New York : Henry Holt & Co. By PROFESSOR SIMON NEWCOMB, U. S. Navy.

Professor Newcomb is so well, and favorably, known as a writer, that any commendation of these books is unnecessary. It is sufficient to say that the Public expect from this author nothing below *first class* productions, and that they will not be disappointed in these books.

ERRATA.

On page 65, line 12, for "weights" read masses.

" " 91, " 10, 11 and 14, change last sign from — to +.

" " 93, for "S" and "P" on line AB of Fig., read F' and F'', and
 for "x", at foot of perp. from D, read S.

" " 94, line 19 from bottom, for "division", read divisors.

" " 110, " 17, for "equation of motion", read equations, &c.

" " " " 20, for "*Celestium*" read *Cœlestium*.